

06-NOV-09
12:45:28

GEORGIA DEPARTMENT OF TRANSPORTATION
PRECONSTRUCTION DIVISION - OFFICE OF BRIDGE & STRUCTURAL DESIGN
THE ANALYSIS AND DESIGN OF PIERS FOR BRIDGES - V 4.2.07 - AASHTO SPECS 1984 INTERIM
REVISED: JUNE 30, 2008
32' CURB-CURB; 4 BEAMS; 155' SPAN; 70' TALL; BRIDGE 2A ; PIER 5

PROB. NO. 0001

DESIGN NO.	NO. CAN	NO. COL	NO. LLC	SKEW D	ANG M	F'C S	FC PSI	N	FY PSI	FS PSI	DESIGN DATA EC KSI	ES KSI	CONC. STRAIN	Z FACT	* MAIN SIZE	* STR SIZ	* CAP MAX TOP	REINFORCING MAX BOT	STEEL MIN	* MIN NO.	* TOP CL.	* MIN S.SP	* CAP DEPTH	* BOT CL.																	
D D D L	2	1	6	0-00-00		3500.	1400.	8.	60000.	24000.	3409.	29000.	0.0030	170.	11	5	16	16	11	2	2.00	4.00	3.00	2.00																	
COLUMN MIN.P	1.00	REINFORCING MAX.P	8.00	STEEL CL.SP.	2.50	R CLEAR	3.750	KL MODE	2	OC COEF	2.00	OF	0.70	CM	0.90	BD1	1.00	BD2	1.00	IMPACT	0.75	SOIL	16.95	WT	0.120	ALL.S.P.	0.000	MIN PL	3.00	MAX PL	9.00	EDGE DIST	1.250	PILE DEPTH	1.000	REBAR CLEAR	3.000	ALL.PILE CAPACITY	235.000	ALL.PILE UPLIFT	-9.999

CAP DATA

CN	C	L	A	DE	BC	BE	DH	LH	XB1	XB2	XB3	XB4	XB5	XB6	XB7	XB8
11	L	17.625	4.000	4.000	6.000	6.000	4.000	13.625	14.000	9.333	0.667					
12	2	SAME AS CANTILEVER 1														

COLUMN DATA

CN	P	I	T	S	HT	A	DT	BT	DB	BB	DL	FLEX	ND NB	SZ ND	NB SZ	ND NB	SZ ND	NB SZ	SLOPE	EP	AP						
21	0	C	T		70.000	0.000	8.000	6.000	8.000	6.000	6.000	0.000	8	6	11	8	6	11	22	16	11	22	16	11	0.000	0.000	0.000

FOOTING DATA

CN	S/P	B	D	T	DEL.B	DEL.D	DEL.T	R.B/D	R.D/B	S.HT.	NP	SYM.	BP	DP	SET.												
31	P	10.000	10.000	3.000	0.500	0.500	0.250	1.000	1.000	2.500	4	3	0.000	0.000	0.000												
GROUP II WIND INTENSITIES * WIND FORCE ARM * WIND ON PIER																											
SUPERSTRUCTURE AREA*STD. TRANS. LONG. WIND FT1 FL1 WIND ON SUPERSTRUCTURE INTENSITIES FT2 FL2 FT3 FL3 FT4 FL4 FT5 FL5 WIND ON LIVE LOAD INTENSITIES FT1 FL1 FT2 FL2 FT3 FL3 FT4 FL4 FT5 FL5 LENGTHS OF LL * WIND ON LL ARMS TRANS. LONGI. APT APL																											
		1485.	1485.	1	50	0	44	6	41	12	33	16	17	19	7.292	7.292	8.876	18.271									

STD. WIND	* FT1	ON FT2	SUPERSTRUCTURE FT3	INTENSITIES FL3	FT4	FL4	FT5	FL5	* STD. WIND	* FT1	ON FT2	LIVE LOAD FT3	INTENSITIES FL3	FT4	FL4	FT5	FL5	* LENGTHS	OF LL	* WIND	ON LL	ARMS	TRANS.	LONGI.	APT	APL
1	50	0	44	6	41	12	33	16	17	19	1	100	0	88	12	82	24	66	32	34	38	155.0	155.0	15.417	15.417	

CENTRI. FT	TRACTION FL	FORCE APT	MISCELLANEOUS FORCES AND ARMS APL	EXPANSION COEFFICIENT	SHRINKAGE COEFFICIENT	STREAM PT	FLOW PL
16.592	5.860	15.417	15.417	0.00018000	0.00044000	0.000	0.000

DEAD LOAD SUPERSTRUCTURE AND LIVE LOAD CASES

I.D.	NL	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12
D.L.	0	381.340	344.900	0.000	0.000	391.370	326.350						
LL01	1	28.870	58.190	0.000	0.000	86.870	109.460						
LL02	1	122.960	66.740	0.000	0.000	62.270	26.630						
LL03	2	43.030	98.980	0.000	0.000	141.520	136.090						
LL04	2	41.780	102.850	0.000	0.000	149.140	114.170						
LL05	2	131.350	124.930	0.000	0.000	102.580	37.370						
LL06	2	151.830	109.600	0.000	0.000	95.060	34.600						

COLUMN MOMENTS(KIP-FEET), SHEARS(KIPS), REACTIONS(KIPS)

LOAD	COL	TRANSVERSE							* LONGITUDINAL					
		PC	MT	V	MB	RF	ML	MR	MT	V	MB	MF		
UNIT F.AT CL.CAP	1	0.000	-6.000	1.000	70.000	0.000	0.000	0.000	0.000	6.000	1.000	70.000	70.000	
DEAD LOAD TOTAL	1	1648.710 2109.510	-552.984	0.000	552.984	2109.510	7745.846	-7192.861	0.000	0.000	0.000	0.000	0.000	
TRAC. FORCE 1 LN	1	0.000	0.000	0.000	0.000	0.000	0.000	0.000	-125.504	-5.860	-500.544	-500.544		
CENT. FORCE 1 LN	1	0.000	-355.351	16.592	1417.239	0.000	0.000	0.000	0.000	0.000	0.000	0.000		
WIND ON SUBSTR.	1	0.000	-53.256	8.876	621.320	0.000	0.000	0.000	-109.626	-18.271	-1278.970	-1278.970		
GROUP 2 WIND 1 1	1	0.000	-1040.187	83.126	6360.251	0.000	0.000	0.000	-109.626	-18.271	-1278.970	-1278.970		
GROUP 2 WIND 1 2	1	0.000	-1040.187	83.126	6360.251	0.000	0.000	0.000	109.626	18.271	1278.970	1278.970		
GROUP 2 WIND 2 1	1	0.000	-921.755	74.216	5671.579	0.000	0.000	0.000	-228.058	-27.181	-1967.642	-1967.642		
GROUP 2 WIND 2 2	1	0.000	-921.755	74.216	5671.579	0.000	0.000	0.000	228.058	27.181	1967.642	1967.642		
GROUP 2 WIND 3 1	1	0.000	-862.539	69.761	5327.243	0.000	0.000	0.000	-346.489	-36.091	-2656.313	-2656.313		
GROUP 2 WIND 3 2	1	0.000	-862.539	69.761	5327.243	0.000	0.000	0.000	346.489	36.091	2656.313	2656.313		
GROUP 2 WIND 4 1	1	0.000	-704.630	57.881	4409.015	0.000	0.000	0.000	-425.444	-42.031	-3115.428	-3115.428		
GROUP 2 WIND 4 2	1	0.000	-704.630	57.881	4409.015	0.000	0.000	0.000	425.444	42.031	3115.428	3115.428		
GROUP 2 WIND 5 1	1	0.000	-388.813	34.121	2572.557	0.000	0.000	0.000	-484.660	-46.486	-3459.764	-3459.764		

GROUP	WIND	5	2	1	0.000	-388.813	34.121	2572.557	0.000	PIER-32-4-155-70.OUT	0.000	0.000	484.660	46.486	3459.764	3459.764
GROUP 3	WIND 1	1	1	0.000	-644.020	40.438	3232.039	0.000	0.000	0.000	0.000	-32.888	-5.481	-383.691	-383.691	
GROUP 3	WIND 1	2	1	0.000	-644.020	40.438	3232.039	0.000	0.000	0.000	0.000	32.888	5.481	383.691	383.691	
GROUP 3	WIND 2	1	1	0.000	-568.654	35.905	2866.562	0.000	0.000	0.000	0.000	-108.253	-10.014	-749.168	-749.168	
GROUP 3	WIND 2	2	1	0.000	-568.654	35.905	2866.562	0.000	0.000	0.000	0.000	108.253	10.014	749.168	749.168	
GROUP 3	WIND 3	1	1	0.000	-530.972	33.638	2683.823	0.000	0.000	0.000	0.000	-183.618	-14.547	-1114.645	-1114.645	
GROUP 3	WIND 3	2	1	0.000	-530.972	33.638	2683.823	0.000	0.000	0.000	0.000	183.618	14.547	1114.645	1114.645	
GROUP 3	WIND 4	1	1	0.000	-430.485	27.594	2196.520	0.000	0.000	0.000	0.000	-233.861	-17.569	-1358.297	-1358.297	
GROUP 3	WIND 4	2	1	0.000	-430.485	27.594	2196.520	0.000	0.000	0.000	0.000	233.861	17.569	1358.297	1358.297	
GROUP 3	WIND 5	1	1	0.000	-229.511	15.506	1221.915	0.000	0.000	0.000	0.000	-271.544	-19.836	-1541.035	-1541.035	
GROUP 3	WIND 5	2	1	0.000	-229.511	15.506	1221.915	0.000	0.000	0.000	0.000	271.544	19.836	1541.035	1541.035	
LIVE LOAD	LL01		1	283.390	1262.110	0.000	-1262.110	283.390	675.753	-1937.862	0.000	0.000	0.000	0.000	0.000	0.000

□ COLUMN MOMENTS(KIP-FEET), SHEARS(KIPS), REACTIONS(KIPS)

LOAD	COL	PC	MT	TRANSVERSE						LONGITUDINAL				
				V	MB	RF	ML	MR	MT	V	MB	MF		
LIVE LOAD	LL02	1	278.600	-1369.481	0.000	1369.481	278.600	2032.916	-663.434	0.000	0.000	0.000	0.000	0.000
LIVE LOAD	LL03	1	419.620	1501.374	0.000	-1501.374	419.620	1064.360	-2565.734	0.000	0.000	0.000	0.000	0.000
LIVE LOAD	LL04	1	407.940	1229.495	0.000	-1229.495	407.940	1064.921	-2294.416	0.000	0.000	0.000	0.000	0.000
LIVE LOAD	LL05	1	396.230	-1420.028	0.000	1420.028	396.230	2421.948	-1001.921	0.000	0.000	0.000	0.000	0.000
LIVE LOAD	LL06	1	391.090	-1709.078	0.000	1709.078	391.090	2637.123	-928.045	0.000	0.000	0.000	0.000	0.000

□ CAP ANALYSIS AND DESIGN DATA

CAP MOMENTS AND SHEARS

POINT	D.L.TOT.	MOMENTS(KIP-FEET)						SHEARS(KIPS)					
		G1 MAX.+	G1 MAX.-	G2 MAX.+	G2 MAX.-	G3 MAX.+	G3 MAX.-	DL T.LT	DL T.RT	G1 + LT	G1 + RT	G1 - LT	G1 - RT
P 1	-33.476	-33.476	-33.476	-33.476	-33.476	-33.476	-33.476	-19.222	-514.964	-19.222	-514.964	-19.222	-844.587
P 2	-5144.227	-5144.227	-8220.598	-5144.227	-5144.227	-5144.227	-6986.365	-585.223	-1033.593	-585.223	-1033.593	-914.846	-1601.157
P 3	-5835.681	-5835.681	-9290.617	-5835.681	-5835.681	-5835.681	-7904.506	-1039.760	-1039.760	-1039.760	-1039.760	-1607.324	-1607.324
C 1L	-10069.599	-10069.599	-15794.794	-10069.599	-10069.599	-10069.599	-13497.858	-1077.199		-1077.199		-1644.764	
C 1R	-9350.720	-9350.720	-14920.927	-9350.720	-9350.720	-9350.720	-12686.174		1066.123		1668.815		1066.123
P 4	-5161.106	-5161.106	-8320.549	-5161.106	-5161.106	-5161.106	-7052.988	1028.683	1028.683	1631.375	1631.375	1028.683	1028.683
P 5	-4477.039	-4477.039	-7234.487	-4477.039	-4477.039	-4477.039	-6128.206	1022.517	513.736	1625.208	809.187	1022.517	513.736
P 6	-33.477	-33.477	-33.478	-33.477	-33.477	-33.477	-33.477	443.477	19.222	738.928	19.222	443.477	19.222

PT.	M+ UNF. K-FT.		M- UNF. K-FT.		TOP REINFORCE. AS NO.SIZE		BOT. REINFORCE. AS NO.SIZE		CAP DESIGN DATA LEFT STIRRUPS M.SP. AV/IN BAR&SPAC		RIGHT STIRRUPS M.SP. AV/IN BAR&SPAC		D IN.	FC PSI	PS %	FS/FF RATIO	FS/FZ RATIO
	M+	UNF.	M-	UNF.	AS	NO.SIZE	AS	NO.SIZE	M.SP.	AV/IN	BAR&SPAC	M.SP.					
P 1	-25.751	-25.751	3.12	2 # 11	3.12	2 # 11	0.00	0.000	#5@ 0.00	24.00	0.146	#5@ 4.24	60.77		0.08	0.000	0.098
P 2	-3957.098	-5374.127	20.85	14 # 11	3.12	2 # 11	24.00	0.060	#5@10.33	24.00	0.206	#5@ 6.03	93.65		0.35	0.625	1.000
P 3	-4488.986	-6080.389	23.01	15 # 11	3.12	2 # 11	24.00	0.198	#5@ 6.26	24.00	0.198	#5@ 6.26	96.00		0.38	0.652	1.007
C 1	-7192.861	-10382.969	40.34	26 # 11	3.12	2 # 11	24.00	0.208	#5@ 5.96	24.00	0.213	#5@ 5.82	96.00		0.66	0.750	0.938
P 4	-3970.082	-5425.375	20.55	14 # 11	3.12	2 # 11	24.00	0.203	#5@ 6.10	24.00	0.203	#5@ 6.10	96.00		0.34	0.616	0.983
P 5	-3443.876	-4714.005	18.29	12 # 11	3.12	2 # 11	24.00	0.211	#5@ 5.88	24.00	0.060	#5@10.33	93.65		0.31	0.654	1.072
P 6	-25.751	-25.752	3.12	2 # 11	3.12	2 # 11	24.00	0.110	#5@ 5.62	0.00	0.000	#5@ 0.00	60.77		0.08	0.000	0.098

NOTE: *** FS/FZ RATIO EXCEEDS 1.0! ***

□ COLUMN ANALYSIS AND DESIGN OUTPUT

CN	T B	CRITICAL COLUMN LOADS													B	D			
		GR	LLC	WC	R	E S	C F	S F	PF	MTF	MLF	PM	MTM	MLM			PU	MTU	MLU
1	T	1	LL06	0.0			C	2992.4	-5353.2	0.0	2992.4	7855.4	3423.7	6095.7	16044.5	6992.9	2.042	72.00	96.00
1	B	3	LL06	3.1			C	3250.8	10114.5	-2750.5	3250.8	14172.7	4794.9	3768.0	16436.4	5560.7	1.160	72.00	96.00

CN	T B	COLUMN DESIGN DATA													CM	R	PHIC
		B FACE 1 NO.SIZE	B FACE 2 NO.SIZE	D FACE 3 NO.SIZE	D FACE 4 NO.SIZE	AS	PS	BD12	BD	SUMPU	SUMPC	DEL.T	DEL.L				
1	T	15 # 11	15 # 11	8 # 11	8 # 11	71.76	1.038	1.00	0.111	3292.	10335.	1.467	1.907	1.000	2	0.70	
1	B	15 # 11	15 # 11	8 # 11	8 # 11	71.76	1.038	1.00	0.114	2951.	10307.	1.401	1.743	1.000	2	0.70	

F G	LLID	WC	ES	C	S	P	MT	VT	ML	VL	P4	P3	P2	P1	MTF	VBF	VPF	LOAD
-----	------	----	----	---	---	---	----	----	----	----	----	----	----	----	-----	-----	-----	------

PIER-32-4-155-70.OUT															
1 3	LL06	3.1	C	2443.918	7532.660	66.822-2115.732	-26.267	115.605	64.710	242.328	293.223	254.759	44.296	36.230	MAX.P1
1 3	LL06	1.1	C	3177.09310505.139	95.708-1800.212	-22.362	130.287	86.980	335.026	378.333	340.365	59.102	47.099	MAX.MT	
1 3	LL06	1.1	C	3177.09310505.139	95.708-1800.212	-22.362	130.287	86.980	335.026	378.333	340.365	59.102	47.099	MAX.VT	
1 3	LL05	1.1	C	3182.80710183.834	95.708-1800.212	-22.362	134.220	90.913	331.765	375.072	336.873	58.525	47.185	MAX.VP	
1 3	LL05	5.1	C	3182.807	7570.672	63.297-3304.759	-41.023	183.744	104.246	282.241	361.739	301.843	42.686	47.185	MAX.ML
1 3	LL05	5.1	C	3182.807	7570.672	63.297-3304.759	-41.023	183.744	104.246	282.241	361.739	301.843	42.686	47.185	MAX.VL
1 2		1.1		2109.510	6913.235	83.126-1278.970	-18.271	91.869	60.781	226.721	257.809	227.443	39.781	31.194	MAX.P3

FOOTING 1 ANALYSIS/DESIGN RESULTS

FOOTING SIZE			* BAR REINFORCEMENT STEEL *							SECTION CAPACITIES *			
B	D	T	P1/PA	AS	NO.SIZE	SPAC.	PLACEMENT	MT.	VB	VP	DS	FC	
22.600	22.600	6.000	0.998	1.31	30 # 9	@ 9.000	TOP LONG	322.868	66.579	133.158	55.166	0.000	
				1.37	25 #10	@10.750	BOT.TRAN	348.871	68.026	136.052	56.365	0.000	

NUMBER OF PILES = 17 BP = 3.350 DP = 3.350